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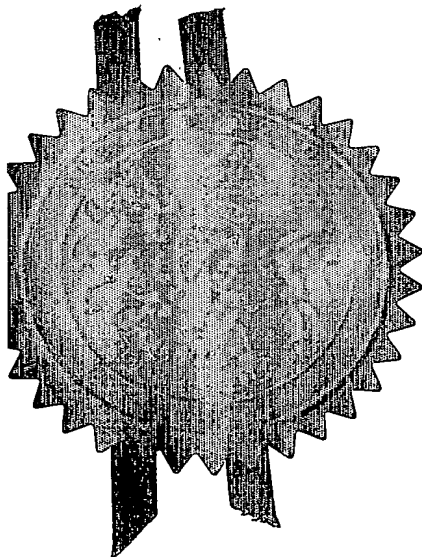
I, the undersigned, being an officer duly authorised in accordance with Section 74(1) and (4) of the Deregulation & Contracting Out Act 1994, to sign and issue certificates on behalf of the Comptroller-General, hereby certify that annexed hereto is a true copy of the documents as originally filed in connection with the patent application identified therein.

I also certify that under the Patents Act 1977, the application is now proceeding in the name as substituted.

In accordance with the Patents (Companies Re-registration) Rules 1982, if a company named in this certificate and any accompanying documents has re-registered under the Companies Act 1980 with the same name as that with which it was registered immediately before re-registration save for the substitution as, or inclusion as, the last part of the name of the words "public limited company" or their equivalents in Welsh, references to the name of the company in this certificate and any accompanying documents shall be treated as references to the name with which it is so re-registered.

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*le Behen*

Dated

28 August 2003

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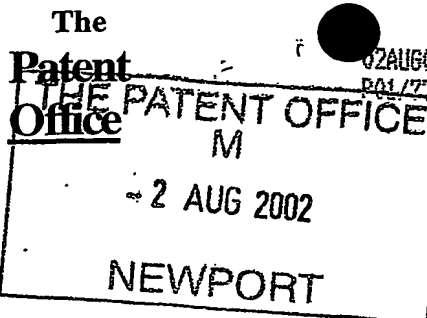
By virtue of a direction given under Section 30 of the Patents Act 1977, the application is proceeding in the name of

FORD GLOBAL TECHNOLOGIES LLC,  
Suite 600 Parklane Towers East,  
One Parklane Boulevard,  
Dearborn,  
Michigan 48126-2490,  
United States of America

Incorporated in USA - Delaware,

[ADP No. 08600959001]

Act 1977



02AUG02 E738079-1-001520  
P01/7700 0.00-0217953.9

# Request for grant of a patent

The Patent Office

Cardiff Road  
Newport  
Gwent NP10 8QQ

1. Your reference	202-0794GB/RMF		
2. Patent application number	02 AUG 2002	0217953.9	
3. Full name, address and postcode of the or of each applicant.	Ford Global Technologies, Inc. Suite 600, Parklane Towers East One Parklane Boulevard, Dearborn Michigan 48126-2490 USA		
Patents ADP number	07030113004		
If the applicant is a corporate body, give the country/state of its incorporation	Michigan, United States of America		
4. Title of the invention	An Assembly Aid For A Control Cable		
5. Name of your agent	R M Farrow et al		
"Address for service" in the United Kingdom to which all correspondence should be sent.	Land Rover Patent Department 53W5/12 Warwick Technology Park Warwick CV34 6RG		
Patents ADP Number	08019036003		
6. If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or each of these earlier applications and the or each application number.	Country	Priority application number	Date of filing
	.	.	.
	.	.	.
	.	.	.
7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application	Number of earlier application	Date of filing	
8. Is a statement of inventorship and of right to grant of a patent required in support of this request.	YES		

SECTION 30 (1977 ACT) APPLICATION FILED 5/12/03

# Patents Form 1/77

9. Enter the number of sheets for any of the following items you are filing with this form.  
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## Continuation sheets of this form

Description	7	/
Claim(s)	3	/
Abstract	1	/
Drawing(s)	2 + 2	/

10. If you are also filing any of the following, state how many against each item.

## Priority documents

### Translations of priority documents

Statement of inventorship and right to grant of a patent (*Patents Form 7/77*) 1+2 ✓

Request for preliminary examination and search (*Patents Form 9/77*) 1 ✓

Request for substantive examination (*Patents Form 10/77*)

Any other documents  
(please specify)

11.

I/We request the grant of a patent on the basis of this application.

Signature

Date

01 August 2002

*R M Farrow*

R M Farrow

Agent

12. Name and daytime telephone number of person to contact in the United Kingdom.

R M Farrow

01926 482152

**PATENT APPLICATION - DATASHEET / INFORMAL FRONT SHEET**

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                          **Parklane Towers East**  
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                          **Michigan**  
                          **48126-2490**  
                          **US U.S.A.**

**Applicants Ref: 202-0794GB/RMF**

**Title: AN ASSEMBLY AID FOR A CONTROL CABLE**

**Priority:**

**Country:** GB United Kingdom

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Please notify the above contact if any of the above details are incorrect or inconsistent with the application forms.

REPORT COMPLETED

## An Assembly Aid for a Control Cable

### Field

This invention relates to an assembly aid for a control cable, typically a Bowden cable, which allows the free length of the inner cable to be altered relative the outer sleeve and in particular to such cables when used as control cables for vehicle parking brakes.

### Background of the Invention

10 When building vehicles on a production assembly line, the rear drum brake assembly of a motor vehicle braking system may be pre-assembled before being attached to the vehicle body and the parking brake cables may be subsequently attached to an internal lever through the drum brake back plate. Some known drum brake assemblies are provided with a "quick fit" device on the internal brake lever which enables the  
15 assembly of a cable end fitting to the lever even though direct access to the braking mechanism is precluded. This quick fit devices are well known and form no part of the present invention.

One problem with this type of fitting is that there is no way of verifying that the cable  
20 is successfully latched to the lever until the vehicle braking system is assembled and the parking brake is actuated. This is particularly so for electrically operated parking brakes. A further problem with electrically operated parking brakes is that the normal cable travel required for assembly purposes is a significant proportion of the total cable travel available during an operational stroke of the actuation mechanism.

The present invention provides a cable end fitting which enables the successful connection of the Bowden cable to the parking brake lever to be verified, and also reduces assembly travel in the cable.

5    Statements of Invention

According to the present invention there is provided a control cable assembly aid for use with a Bowden cable having an inner cable slidable within an outer sleeve, the assembly aid comprising a body which in use is fixedly mounted to a support and has a first bore through which the inner cable can pass, an end fitting mountable to one  
10    end of the outer sleeve of the Bowden cable and having a second bore through which the inner cable passes with at least a portion thereof through which the cable passes being insertable into said first bore, and abutment means removably located between the fitting and body to limit insertion of said portion into the first bore.

15    Preferably said portion of the end fitting is substantially cylindrical in shape and is slidable within the first bore, and more preferably the end fitting is cylindrical with its whole length being slidable within the first bore, the external surface of the end fitting having an annular groove therein which accommodates the abutment means. The abutment means may be formed from an arcuate spacer which engages in said groove.

20    The spacer may be formed from a circlip but is preferably a "C" shaped held in the groove by a cap rotatably mounted on the end fitting and which is securable to the body to hold the spacer in position.

The cap may be secured by any suitable means, for example by bayonet type connection, by resilient clip means, but is preferably a screw threaded cap which is engagable with a co-operating screw threaded portion on the body.

5 The body is preferably a tubular body having a hollow spigot at at one end which in use is fixed to a support, and which has an open circular mouth at its other end which in use receives said one portion of the end fitting, the abutment means abutting the mouth of the tube. The body may have drain aperture passing through the tubular sidewall.

10 According to a second aspect of the present invention there is provided a parking brake for a vehicle and which is operable by Bowden cable with a cable assembly aid according to the first aspect of the invention mounted to the end of the Bowden cable adjacent the brake, preferably the parking brake is part of a drum brake assembly and the adjuster body is secured to a back plate of a brake assembly.

15

According to another aspect of the present invention there is supplied a method of attaching to a vehicle parking brake lever one end of the inner cable of a Bowden cable, said method using an assembly aid comprising a body having a first bore through which the cable can pass, an end fitting having a second bore through which  
20 the cable passes and at least a portion thereof through which the cable passes being insertable into said first bore, and abutment means removably locatable between the fitting and body to limit insertion of said portion into the first bore, wherein in said method the body is secured to a brake assembly, the end fitting is attached to one end of the outer sleeve of the Bowden cable with inner the cable passing through said  
25 second bore, said portion of the end fitting is inserted into the first bore and the inner



cable is fed through the first bore to connect with said lever, the Bowden cable then being pulled to check the connection and retract said portion, and the spacer then being located between the body and end fitting, and locked in position.

- 5 The spacer may be locked in position by fitting a cap coaxially mounted on the end fitting, the cap being secured to the body to lock the spacer in its location.

### Description of the Drawings

The invention will be described by way of example and with reference to the  
10 accompanying drawings in which:

- Fig. 1 is a cross-section through an assembly aid according to the present invention,
- Fig. 2 is a section through the aid shown in Fig. 1 in assembly with a Bowden cable and parking brake back plate and
- 15 Fig. 3 is an isometric view of a spacer as is used in Figs. 1 & 2.
- Fig. 4 is a schematic drawing showing the principle of fitting of a Bowden cable to a brake lever using the present invention.

### Detailed Description of the Invention

- 20 With reference to both Figs. 1 and 3 of the drawings, there is shown an assembly aid for attaching a Bowden cable 11 to a brake lever 12 of a parking brake. The Bowden cable 11 has an inner cable 13 with a nipple 14 firmly attached to one end and is slidable within an outer sleeve 15. In use the nipple is attached to the brake lever using a quick fit device (shown schematically in Fig 4 ) on the internal brake lever 12. The

assembly aid 20 is provided in order to aid attachment of the inner cable 13 to the lever and to provide a means for quickly verifying that the connection has been made.

The assembly aid comprises a tubular body 21, a end fitting 31, a coaxial cap 41, and  
5 a spacer 51.

The tubular body 21 having a central bore 22 through which the inner cable 13 and nipple 14 can pass. The body 21 has a shoulder 25 at one end with a coaxial hollow spigot 23 for securing the body to a support 17, in this example a back plate of a drum  
10 brake assembly. The other end of the body 21 has annular mouth 26 with a screw thread 27 formed on the external surface of the body adjacent the mouth 26 of the bore 22. In use the body 21 is welded to the back plate 17. The tubular body 21 has a plurality of spaced holes 28 passing through the tubular sidewall. These holes 28 act as drain holes and allow the escape of water vapour.

15

The end fitting 31 is substantially cylindrical in shape and comprises a larger diameter inner portion 37 and a smaller diameter outer portion 36 with an annular slot 38 located axially between the two different diameter portions. The outer end portion 36 of the fitting 31 has a coaxial circular recess 32 therein which in use  
20 accommodates the end portion of the outer sleeve 15 of the Bowden Cable 11. A coaxial through bore 33 in the fitting provides a passageway for the inner cable 13 but does not permit the passage of the nipple 14. The inner end portion 37 is a slide fit in the bore 22 and has a hollow spigot 34 thereon on which a rubber bellows seal 35 is mounted. The seal 35 acts between the spigot 35 and inner cable 13 to prevent the  
25 ingress of dirt and water into the Bowden cable.

The cap 41 is arranged coaxially of the end fitting 31 and has a circular end wall 42 from which an annular sidewall 44 extends. The end wall 42 has a central aperture 43 which accommodates the outer end portion 36 of the fitting but will NOT pass over the inner end portion 37 of the fitting. The cap 41 is free to rotate about the fitting and the inner surface of the side wall 44 is provided with a screw thread 45 which co-operates with the screw threaded portion 27 on the outside of the tubular body 21. In use, the Bowden cable will be supplied with the cap 41, end fitting 31 and seal 35 in an assembled condition.

10

The spacer 51 is an arcuate "C" shaped spacer which may be formed from any suitable material such as glass filled polyamide, mild steel, brass etc.. The spacer 51 has a key hole shaped open sided aperture 52 provides a snap fit with the fitting when the spacer is inserted radially into the slot 38. When the spacer 51 is in location it limits the insertion of the end fitting 31 into the bore 22 by abutment with the mouth 26 of the body. The spacer 51 has an outer diameter slightly less than the outer diameter of the mouth 26 allowing the cap to pass over the spacer 51 and to be screwed onto the body 21 to prevent accidental withdrawal of the spacer.

20

With reference now to Fig. 4, when the Bowden cable 11 is assembled to a parking brake lever 12, the inner cable 13 is fed through the bore 22 in the body 21 as far into the brake drum as possible so that the nipple 14 travels past the quick fit device 18 on the brake lever 12. This is facilitated by insertion of the fitting 31 into the bore 22 as far as is possible, or up to a stop (not shown) which may be formed by a step within the bore 22, a separate sleeve within the bore or other suitable means. This limits the

25

amount of push through of the cable to that required for assembly to the quick fit device 18 and avoids excessive compression of the boot 35.

5 The cable 11 is then retracted causing the nipple 14 to become trapped by the quick fit device 18 and aligning the groove 38 in the fitting 31 with the mouth 26 on the body. A further sharp tug on the cable will ensure that the connection has been properly made.

10 The spacer 51 is then clipped in position and the cap screwed over the body to ensure the spacer remains in position.

The thickness of the spacer 51 and the total available length of insertion of the fitting 31 into the body, will be determined by a number factors such as the maximum actuation travel of the cable in use, amount of over travel required by the inner cable on assembly to the brake lever, elastic losses in the cable itself, tolerances and in the length of cable.

### Claims

1. A control cable assembly aid for use with a Bowden cable having an inner cable slidable within an outer sleeve, the assembly aid comprising a body which in use is fixedly mounted to a support and has a first bore through which the inner cable can pass, an end fitting mountable to one end of the outer sleeve of the Bowden cable and having a second bore through which the inner cable passes with at least a portion of the fitting through which the cable passes being insertable into said first bore, and abutment means removably located between the fitting and body to limit insertion of said portion into said first bore.

10

2. An assembly aid as claimed in Claim 1 wherein at least said portion of the end fitting is substantially cylindrical in shape and is slidable within the first bore,

3. An assembly aid as claimed in Claim 2 wherein the whole of the end fitting is cylindrical in shape and is slidable within the first bore, the external surface of the end fitting having an annular groove therein which accommodates the abutment means.

15

4. An assembly aid as claimed in Claim 3 wherein the abutment means is an arcuate spacer which engages in said groove.

20

5. An assembly aid as claimed in any one of Claims 1 to 4 wherein the body is a tubular body having a hollow spigot at one end which in use is fixed to a support, and which has an open circular mouth at its other end which in use receives said portion of the end fitting, the abutment means abutting the mouth of the tube.

25

6. An assembly aid as claimed in Claim 5 wherein the spacer is a "C" shaped spacer which is held in the groove by a cap coaxially mounted on the end fitting and which is securable to the mouth of the tube to hold the spacer in position.

5 7. An assembly aid as claimed in Claim 6 wherein the cap is a screw threaded cap which is engagable with a co-operating screw threaded portion of the body.

8. An assembly as claimed in any one of Claims 5 to 7 having drain holed passing through the body.

10

9. An assembly as claimed in any one of Claims 1 to 8 wherein a stop means acts between the fitting and said portion to also limit insertion of said portion into said first bore in the absence of the abutment means.

15 10. A parking brake for a vehicle and which is operable by Bowden cable and which includes a cable assembly aid as claimed in any one of Claims 1 to 9 mounted to the end of the Bowden cable adjacent the brake.

11. A parking brake as claimed in Claim 10 being a drum brake assembly and having  
20 the body of the assembly aid mounted to the back plate of the drum brake assembly.

12. A method of attaching to a vehicle parking brake lever one end of the inner cable of a Bowden cable, said method using an assembly aid comprising a body having a first bore through which the cable can pass, an end fitting having a second  
25 bore through which the cable passes with at least a portion thereof through which the

cable passes being insertable into said first bore, and abutment means removably locatable between the fitting and body to limit insertion of said portion into second bore, wherein in said method the body is secured to a brake assembly, the end fitting is mounted to one end of the outer sleeve of the Bowden cable with inner the cable  
5 passing through said second bore, said portion of the end fitting is inserted into the first bore and the inner cable is fed through the first bore to connect with said lever, the Bowden cable then being pulled to check the connection and retract said portion, and the spacer then being located between the body and end fitting and locked in position.

10 13 A method as claimed in Claim 12, wherein the spacer is locked in position by fitting a cap coaxially mounted on the end fitting, the cap housing the spacer and being secured to the body to lock the spacer in its location.

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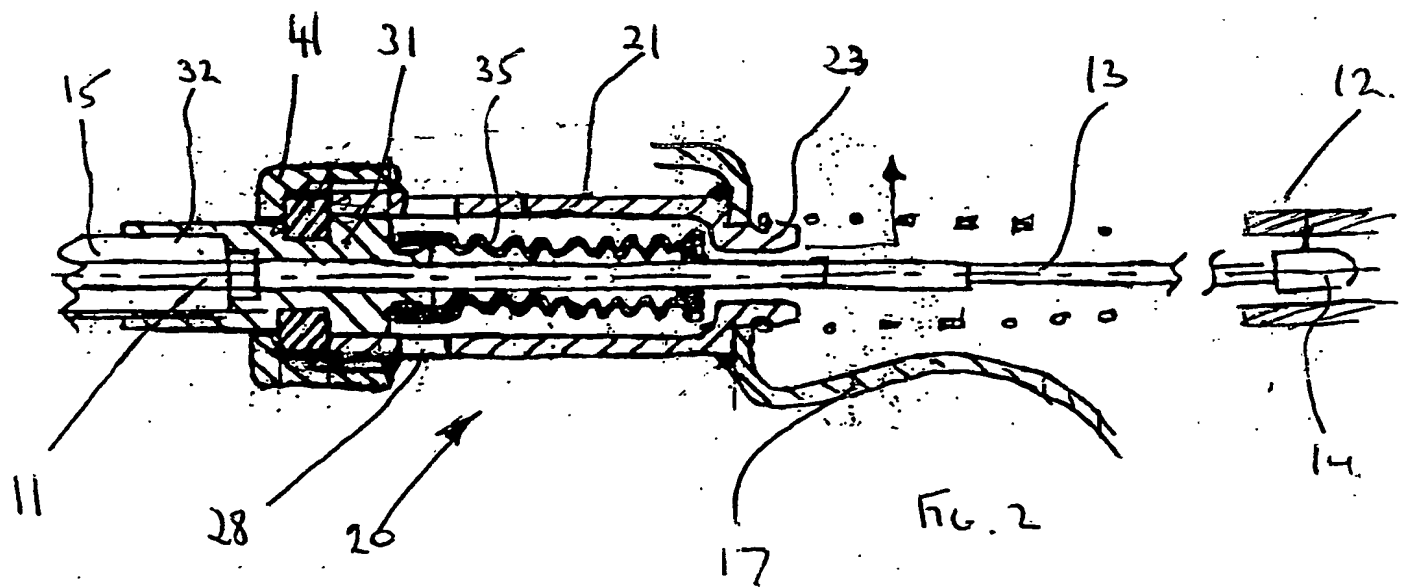
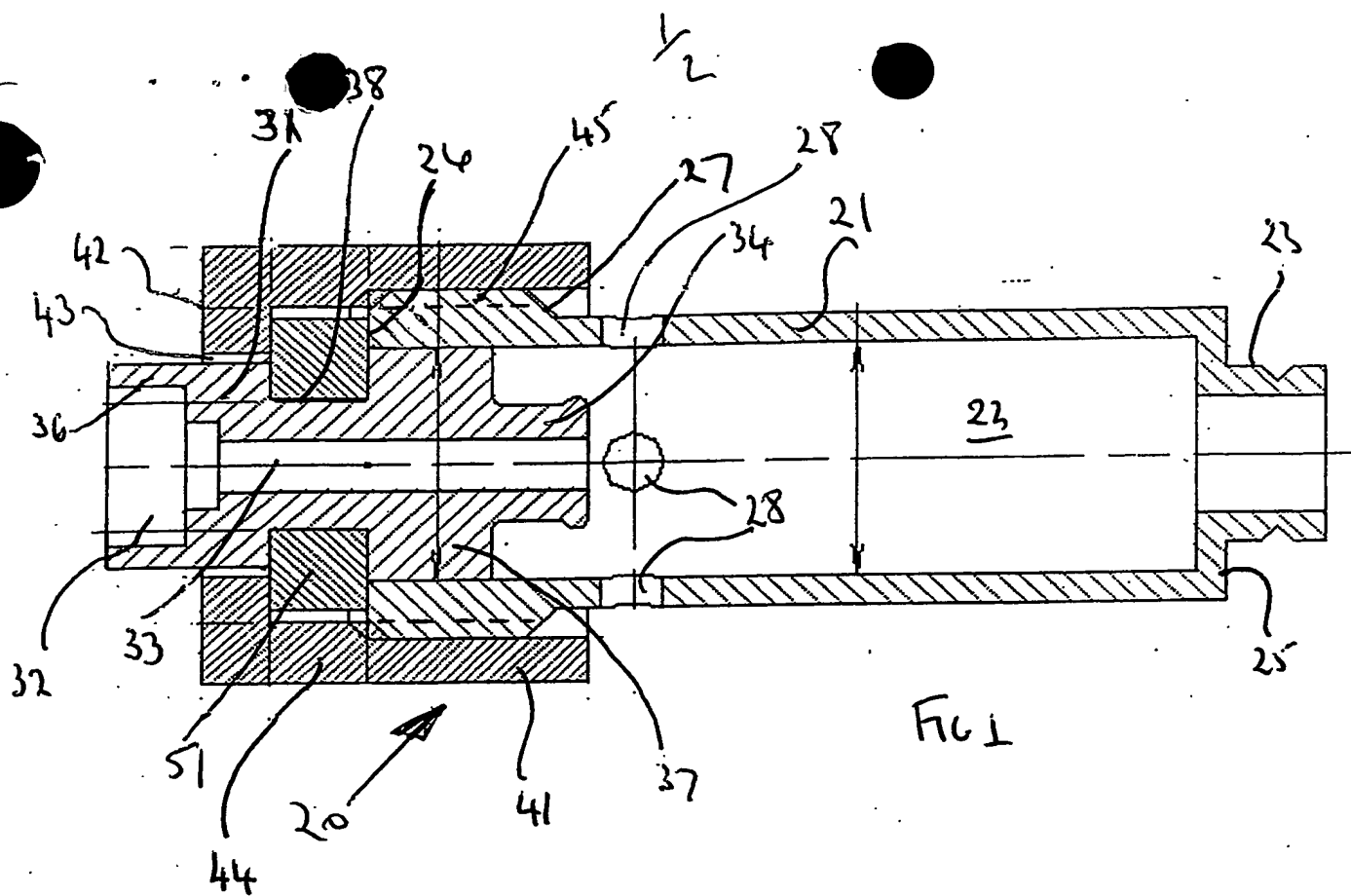
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**Abstract**

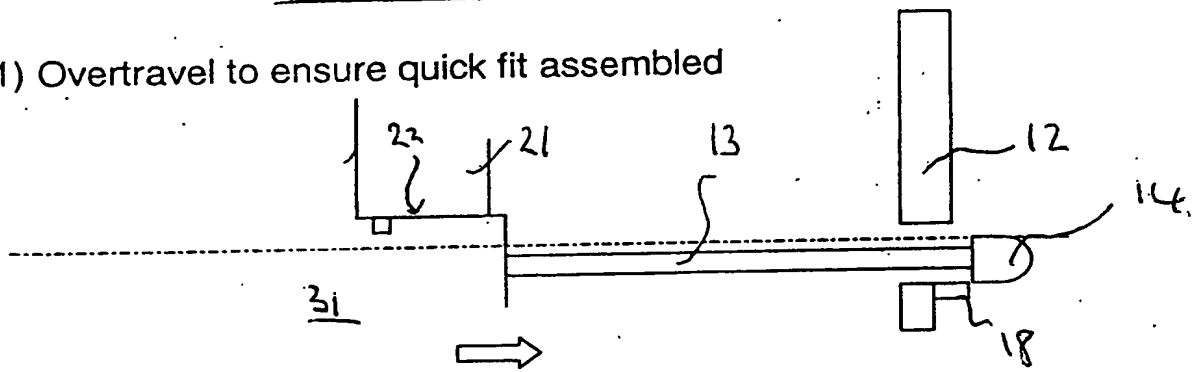
A n assembly aid 20 for use with a Bowden cable 11, in particular a parking brake cable, and having an inner cable 13 slidable within an outer sleeve 15, the assembly  
10 aid 20 comprising a body 21 which in use is fixedly mounted to a support 17 and has a first bore 22 through which the inner cable 13 can pass, an end fitting 31 mountable to one end of the outer sleeve 15 of the Bowden cable and having a second bore 33 through which the inner cable 13 passes with at least a portion 37 of the end fitting being insertable into said first bore 22, and abutment means 51  
15 removably located between the fitting 31 and body 21 to limit insertion of said portion into the first bore 22.



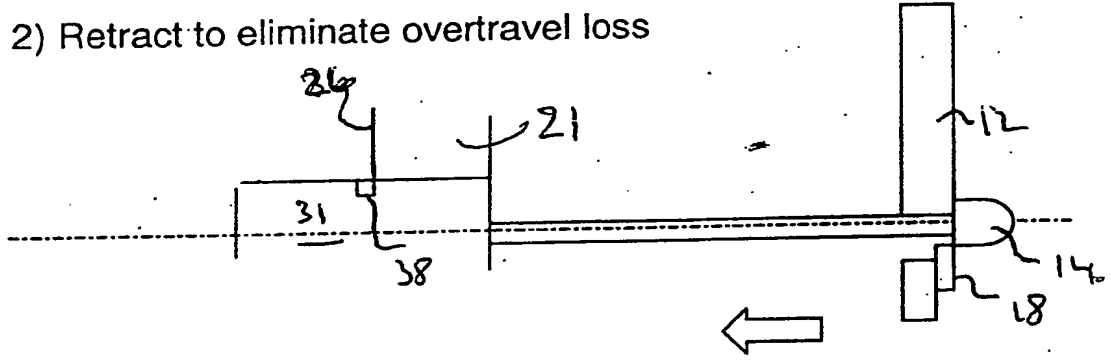


2/2

1) Overtravel to ensure quick fit assembled



2) Retract to eliminate overtravel loss



3) Assembly clip to fix parts

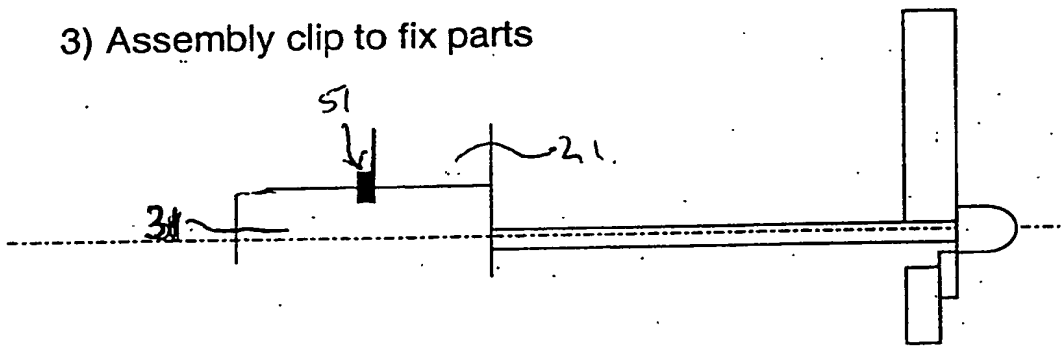


FIG. 4



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